Regional Goods Movement Study for the San Francisco Bay Area

Data Reconnaissance and Trends Final Report (Task 2)

submitted to
Metropolitan Transportation Commission

developed by
Cambridge Systematics, Inc.

with
The Tioga Group
Hausrath Economics Group

June 20, 2003

CAMBRIDGE SYSTEMATICS INC

Table of Contents

CAMBRIDGE SYSTEMATICS INC

Introduction/Executive Summary

This report presents the results of Task 2, Data Reconnaissance and Trend Analysis for the Regional Goods Movement Study for the San Francisco Bay Area. Task 2 compiled all of the available data necessary for identifying major goods movement trends and issues and for planning and evaluating future goods movement policies, programs, and projects. Information is presented in three major categories.

1. The data enumerates how goods movement activities impact domestic and international trade. The data helps explain the role of goods movement in the economy, identify the critical goods movement corridors, and determine which industries use these corridors.

2. The data on logistics trends and patterns (i.e. how, when and where goods are shipped) show how the rapidly evolving world of logistics and supply chain management is changing the way goods are distributed and the performance demands that are being placed on the regional transportation system.

3. The data on goods movement infrastructure and traffic show which elements of the regional transportation infrastructure are most critical to goods movement and how traffic trends are impacting the region's highway, rail, seaport, and airport systems.

These data already indicate some key issues for local planners and decision-makers. The data will be used in the study's Phase II analysis to help identify regional goods movement issues for local stakeholders and to analyze and evaluate potential solutions.

Introduction (continued)

The Regional Goods Movement Study, which began in February 2003, has the following objectives:

- To provide information about the economic significance of goods movement and the goods movement industries;
- To provide guidance to the Metropolitan Transportation Commission (MTC) for addressing goods movement issues and planning goods movement investments in the next regional transportation plan (RTP); and
- To provide the Bay Area with a common platform for addressing goods movement issues in the reauthorization of federal surface transportation legislation.

The study is being conducted in two phases. Phase I is designed to compile data that will provide the basis for understanding goods movement trends and issues. It also will: develop a Bay Area goods movement platform for federal transportation funding reauthorization and state policy decisions (completed – see Reauthorization Issues Technical Memorandum, March 2003); specifically address the economic significance of goods movement in the region through a cluster analysis; and identify key land-use and community impact issues related to goods movement. Phase II will consist of broad stakeholder outreach to identify specific big-picture issues, and programs, policies, and projects needed to address these issues.

1. Five Major Bay Area Goods Movement Planning and Policy Findings

1) Measured in terms of tonnage, almost 50 percent of Bay Area goods are moved with both origin and destination within the region; about 80 percent of this is moved by trucks. Thus, the region will continue to need efficient and reliable intra-regional corridors. This is especially important in the corridors linking Santa Clara/Alameda/Contra Costa counties, where the largest tonnage of freight is exchanged within the region (see page 13).

2) The Interstate 880 (with support from I-80/580/680) and U.S. 101 corridors will continue to be the most significant intra-regional goods movement corridors. We expect to see growing conflicts between truck traffic patterns and commuter patterns in these corridors (see page 14). MTC and other local agencies will need to evaluate a variety of operational strategies to address this problem, since capacity expansion opportunities will be limited.

1. Five Major Bay Area Goods Movement Planning and Policy Findings (continued)

3) Implications of regional land development patterns on truck traffic flows need to be better understood, particularly given the limited access opportunities to the interstate network:

- Shifting truck-intensive land uses from the Bay Area into the Northern San Joaquin Valley will put pressure on I-580, which is a major truck corridor serving multiple purposes (see pages 15, 16 and 17).

- Providing for good and reliable access to the long-haul network, while addressing the shifting pattern of warehouse and distribution businesses, will require new strategies (truck lanes, rail shuttles, review of regional land-use strategies, multijurisdictional planning with the San Joaquin Council of Governments. Rail capacity is available, but railroads will continue to shed all but the most profitable market segments.

1. Five Major Bay Area Goods Movement Planning and Policy Findings (continued)

4) International trade growth is critical to the Bay Area. The ability to expand marine and air terminals to meet future projected demand is limited.

- Access corridors (I-880/580/80 and U.S. 101) are the same as major intra-regional corridors, so reliability of service needs to be ensured. This is particularly critical for time-sensitive products moving by air.

- The Port of Oakland's major highway access route, I-880/80, is one of the most congested and truck-intensive corridors in the region (see page 23). Addressing roadway bottlenecks near the Port of Oakland and on the highway access network will be important. Rail access for shorter-haul markets could help address this issue.

5) Air cargo is expected to be the fastest growing segment of the freight market (page 26). Bay Area international air trade is critical to high-tech businesses and for certain perishable products. Ensuring the ability to expand air cargo facilities and airport runway capacity is important. Given trends in security regulation, growth through separate air cargo (freighter) facilities may be viable.

2. Bay Area Goods Movement and the Economy

Goods movement is driven by the characteristics of the Bay Area economy and consists of three major trade components: international trade, domestic trade, and local distribution and service activities.

a. The Bay Area serves as an international trade gateway for the region, the state, and the nation. Export container volumes exceed import volumes at the Port of Oakland, indicating their significance to the national economy (see page 25). High-tech products are the largest fraction of international trade commodities for the Bay Area.

b. More high value products (including high-tech products) are being exported than imported in the Bay Area (see page 18). Still, the growth in consumer demand for goods is a strong driver of domestic trade trends. The highest volume of domestic trade involving the Bay Area stays within California (see page 19).

c. Local shipments (largely warehouse/distribution traffic and construction materials) are a large fraction of total goods movement in the Bay Area. Northern San Joaquin Valley is part of the Bay Area economic region for distribution of goods (see pages 15 and 19).

d. Goods movement is an important element of the Bay Area economy. Shipping industries account for 37 percent of industrial output and transportation-dependent industries employ almost 47 percent of Bay Area workers (see page 20).

e. Shifts of warehouse and transportation services to the San Joaquin Valley have occurred over the past decade and are expected to continue over the next 20 years with significant implications for truck traffic patterns, air quality, and community impacts (see page 17). This issue will be evaluated in more detail in the study's land-use and community impact analysis (Task 4).

3. Bay Area Goods Movement and Industry Logistics Trends

The trend of smaller inventories means that manufacturers depend on transportation to contend with increased demands for high value, fast, and reliable service.

- Trends in industry logistics will put pressure on the Bay Area transportation network to maintain and improve reliability, with continuing growth in truck and air freight services needed (see page 21). At the same, these trends will create business opportunities in the Bay Area with its strength in high-tech products and services, robust trade sector, and concentration of businesses providing transportation services.

4. Goods Movement Infrastructure and Traffic - Highway

Trucks carry the vast majority (by weight and value) of goods and operate on inter- and intra-regional corridors (see page 22).

a. I-880, I-580, U.S. 101, and I-80 are the four principal truck corridors (see page 23).

b. I-880 and U.S. 101 are primary intra-regional truck corridors, but also provide access to critical international trade facilities and domestic intermodal rail. Most truck-oriented businesses are concentrated in these corridors. The major intra-regional freight flow is among Contra Costa, Alameda, and Santa Clara counties (see page 13).

c. I-580 is a complex truck corridor providing primary access to I-5 and the interstate network, linking to the San Joaquin Valley distribution network as well as the intra-regional network (see page 16).

d. Major intra-regional truck corridors have high levels of congestion (see page 23) with peak truck volumes occurring in the later hours of the morning commute period (page 14). Greater use of night-time warehouse activities could help eliminate this conflict.

5. Goods Movement Infrastructure and Traffic – Rail

Oakland is the center of the Bay Area rail network, and the most significant elements of the rail system are located in the East Bay and along the Suisun Bay Network (north and south).

a. Major intermodal terminals are in Richmond and Oakland (see page 24). Oil refineries and auto terminals along the Suisun Bay Network also generate substantial rail traffic. The Union Pacific (UP) line to Roseville and the Burlington Northern/Santa Fe (BNSF) line to Stockton are the two major rail routes serving the Bay Area.

b. The Bay Area is a consuming region by rail, with inbound tonnage more than twice that of outbound. Contra Costa and Alameda counties are the largest origins and destinations for Bay Area rail traffic. Leading rail commodities are mixed shipments, crushed stone for construction, autos, steel, waste and scrap, petroleum products, and beverages (including wine).

1999 Bay Area Rail Tonnage

	Carload*		Intermodal*		
	Tons	Share	Tons	Share	Total
Inbound	**9,472,020**	**66%**	**4,789,024**	**34%**	**14,261,044**
Outbound	**4,035,598**	**58%**	**2,946,124**	**42%**	**6,981,722**
Total	**13,507,618**	**64%**	**7,735,148**	**36%**	**21,242,766**

*Carload – mixed freight; Intermodal – containers/trailers

6. Goods Movement Infrastructure and Traffic – Marine

Bay Area maritime cargo includes containerized cargo at Oakland and San Francisco, bulk cargoes at San Francisco, Richmond, Redwood City, and Benicia, and crude petroleum, petroleum products, raw sugar, and Bay sand handled at private terminals. The Port of Oakland is the fourth largest West Coast port in terms of total tonnage handled; this amount exceeds all other Bay Area ports combined. Containerized cargo at the Port of Oakland accounts for the largest share of tonnage and value.

a. Annual growth in containerized cargo is forecast at 5 percent, and this cargo will continue to dominate future maritime trade. Rail drayage traffic between marine terminals and either the Union Pacific (UP) or Oakland Intermodal Gateway (OIG) facilities is expected to grow faster than over-the-road trucking.

b. The Port of Oakland is an export port, unlike Los Angeles/Long Beach ports (see page 25).

7. Goods Movement Infrastructure and Traffic - Air

a. Air cargo is the fastest growing segment of the Bay Area goods movement system (see page 26 and 27). Air cargo volume is forecast to triple in the next 20-30 years, with a 125 percent increase in all cargo flights.

b. Issues facing Bay Area international airports:

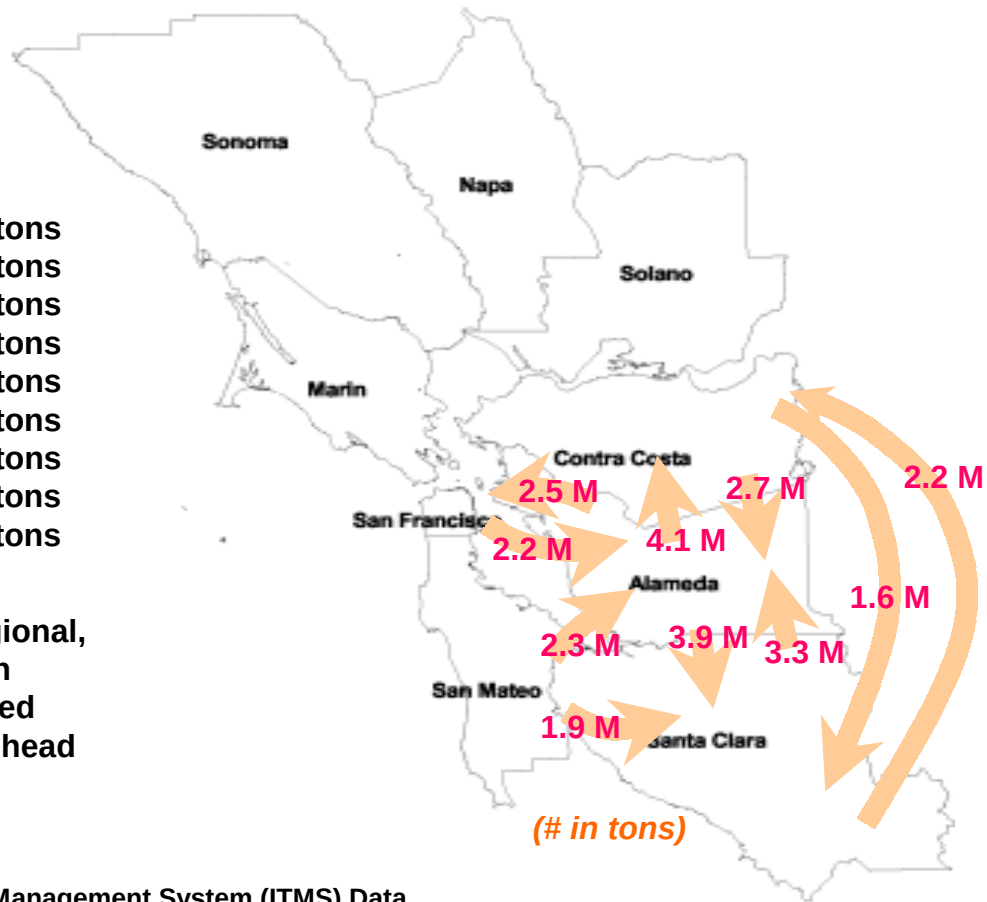
- Oakland – Single runway has insufficient capacity to meet passenger, air cargo and general aviation needs mid- to long-term. Additional runways are needed by 2005-08 and cargo support facilities are needed now.
- San Jose – Land locked, limited air cargo facility development opportunity
- San Francisco – Poor weather capacity problems will increase in the future; space for cargo support facilities are needed now.

Alameda/Santa Clara/Contra Costa Counties Have the Biggest Intercounty and Intracounty Flows

INTRACOUNTY ANNUAL COMMODITY FLOWS

Napa:	**1,821,590 tons**
Solano:	**1,987,590 tons**
Marin:	**3,179,665 tons**
San Francisco:	**2,597,730 tons**
San Mateo:	**7,667,474 tons**
Contra Costa:	**8,422,655 tons**
Sonoma:	**8,804,517 tons**
Santa Clara:	**15,819,508 tons**
Alameda:	**34,822,067 tons**

NOTE: Arrows show top 10 intra-regional, county-to-county commodity flows in millions of tons annually (shown in red text) with arrow tail being origin and head being destination.

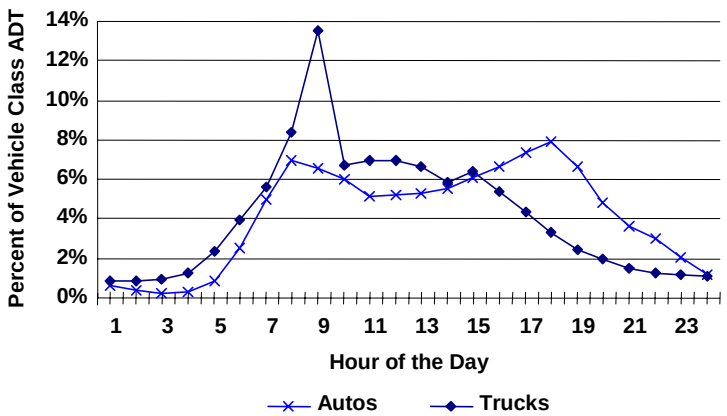


Source: Caltrans 1996 Intermodal Transportation Management System (ITMS) Data

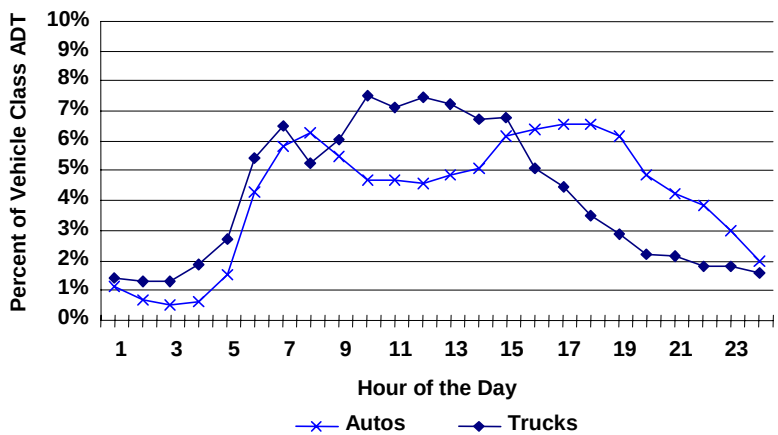
CAMBRIDGE SYSTEMATICS INC

Growing Conflict Between Truck Traffic Patterns and Commuter Patterns

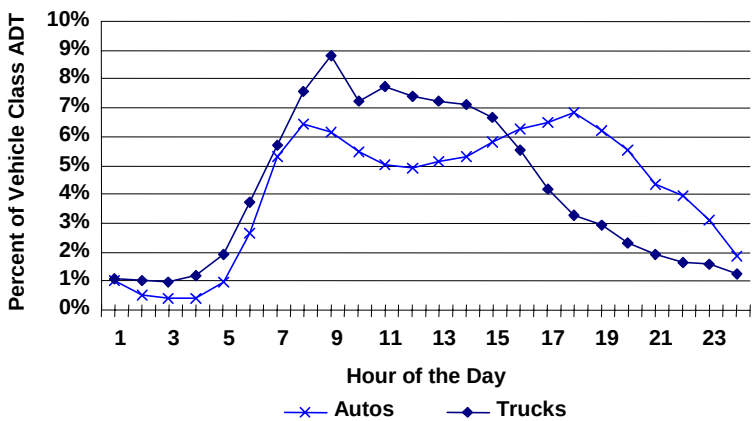
Solano County - Intersate 80 in Cordelia



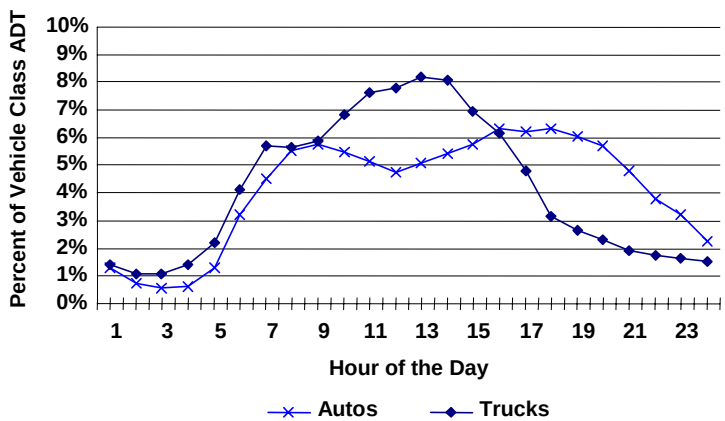
Santa Clara County – U.S. 101 in Gilroy



Contra Costa County – Interstate 680 in Walnut Creek



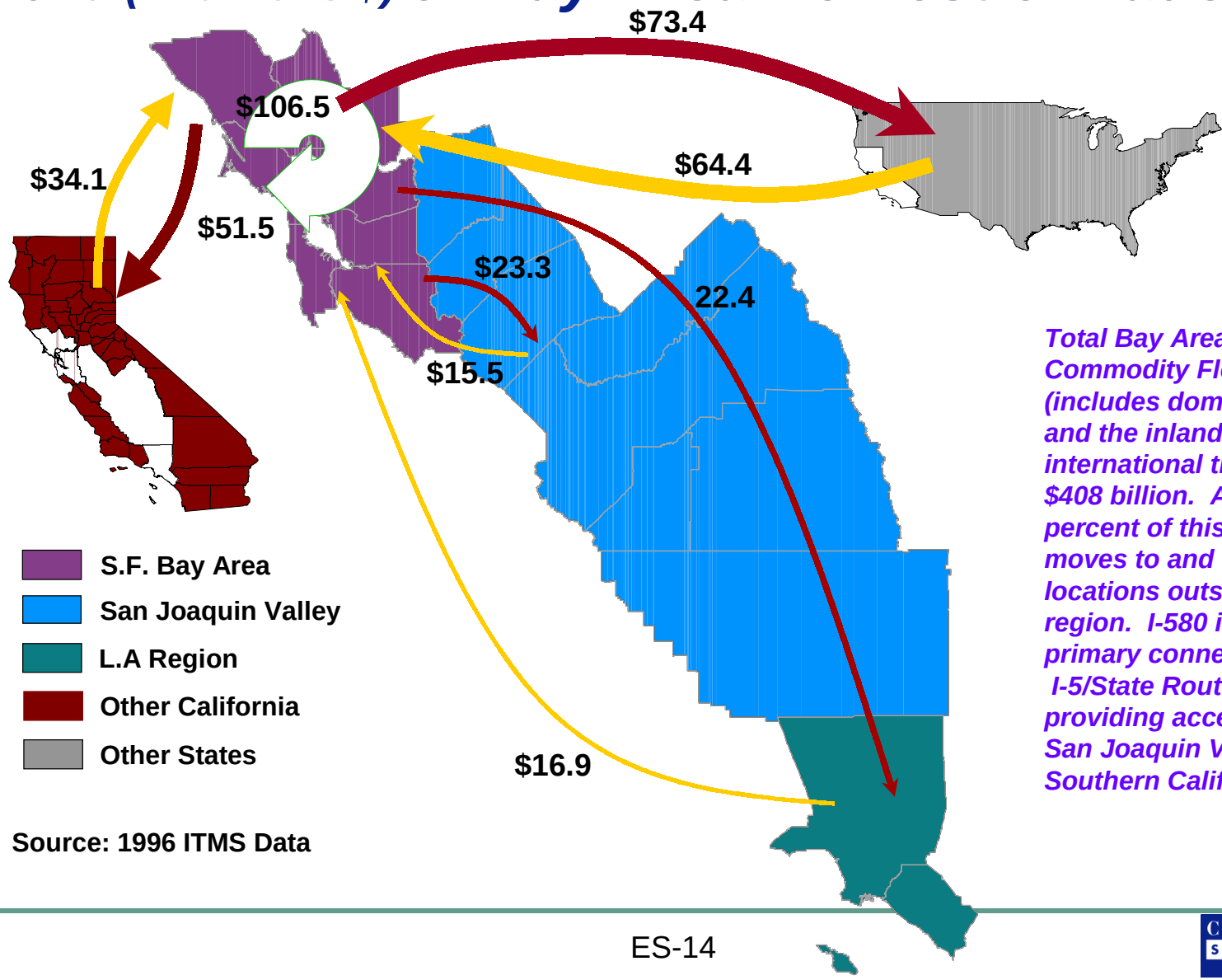
Alameda County - Interstate 880 - Nimitz Freeway



Source: Caltrans 2001-02 Weigh-In-Motion Data.

CAMBRIDGE SYSTEMATICS INC

I-580 is the Primary Gateway for Nearly 20% (in billions $) of Bay Area Domestic Trade Flow



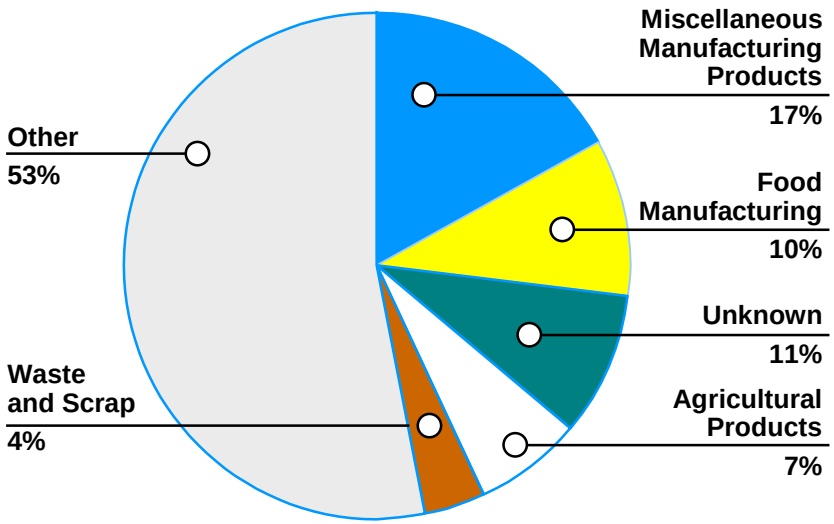
Source: 1996 ITMS Data

Total Bay Area Domestic Commodity Flow (includes domestic trade and the inland portion of international trade) = $408 billion. Almost 75 percent of this amount moves to and from locations outside the region. I-580 is the primary connection to I-5/State Route-99, providing access to the San Joaquin Valley and Southern California.

CAMBRIDGE SYSTEMATICS INC

I-580 Has Among the Highest Truck Volumes in the Region, With Most Traffic Originating or Terminating Outside the Region

Location	Dir		Alameda	Contra Costa	Marin	Napa	SF	Santa Clara	San Mateo	Solano	Sonoma	Other	Total
I-580 Livermore	East Bound (EB)	Origin County	67%	7%	0%	1%	8%	0%	6%	2%	2%	7%	100%
		Destination County	5%	0%	0%	0%	0%	0%	0%	0%	0%	95%	100%
I-580 Livermore	West Bound (WB)	Origin County	2%	1%	0%	0%	0%	0%	0%	0%	0%	97%	100%
		Destination County	61%	7%	1%	1%	13%	4%	3%	2%	1%	8%	100%



Average Distance Between Stops	167 miles (EB)	158 miles (WB)
Average Stops Per Day	4.0 stops (EB)	3.9 stops (WB)
Average Miles Driven Day of Survey	325 miles (EB)	329 miles (WB)

Source: Caltrans Truck Travel Survey

CAMBRIDGE SYSTEMATICS INC

Shifts of Truck-Intensive Land Uses From the Bay Area to Northern San Joaquin Valley Will Add to I-580 Congestion

Industry	Projected Annualized Growth Rates 2000-2020	
	Bay Area	San Joaquin County
Agriculture, Mining	0.08%	-0.30%
Construction	1.18%	1.69%
High Technology/ Other Manufacturing	2.05%	0.20%
Transportation, Communications, Utilities	2.13%	3.63%
Wholesale/Retail Trade	2.17%	5.63%
FIRE*, Services, Government	1.22%	1.99%
Total Jobs	1.14%	2.50%

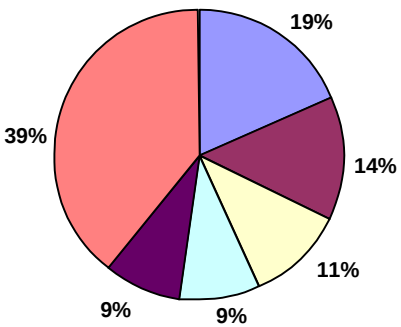
* Finance, Insurance and Real Estate

Source: Association of Bay Area Governments, San Joaquin County Association of Governments

More High-Value Bay Area Products Are Being Exported Than Imported (top 5 commodities)

100% = $ 131 B

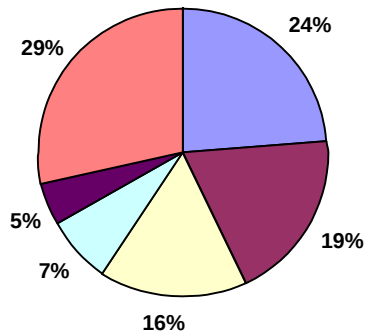
Inbound



- Warehouse & Distribution Center, Rail Intermodal Drayage
- Electrical machinery, equipment or supplies
- Transportation equipment
- Food and kindred products
- Machinery excl. electrical
- Others

100% = $ 171 B

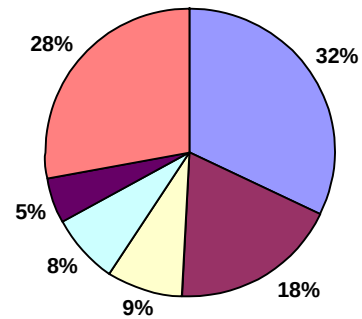
Outbound



- Electrical machinery, equipment or supplies
- Machinery excl. electrical
- Warehouse & Distribution Center, Rail Intermodal Drayage
- Food and kindred products
- Transportation equipment
- Others

100% = $ 106.5 B

Internal



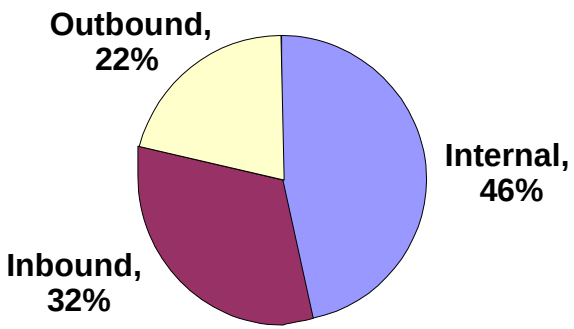
- Warehouse & Distribution Center, Rail Intermodal Drayage
- Electrical machinery, equipment or supplies
- Machinery excl. electrical
- Food and kindred products
- Clay, concrete, glass or stone products
- Others

Source: 1996 ITMS Data

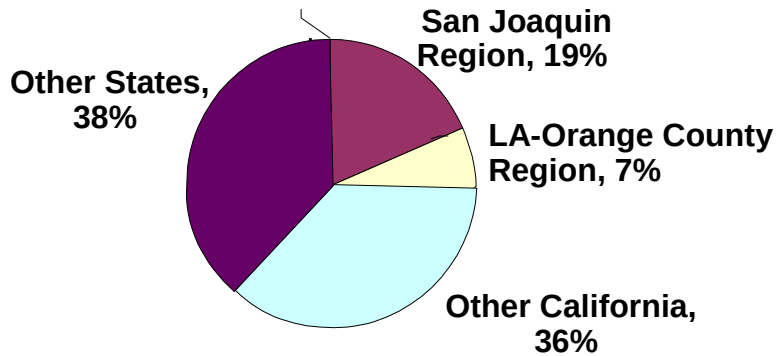
CAMBRIDGE SYSTEMATICS INC

The Highest Volume of Domestic Trade Involving the Bay Area Stays Within California

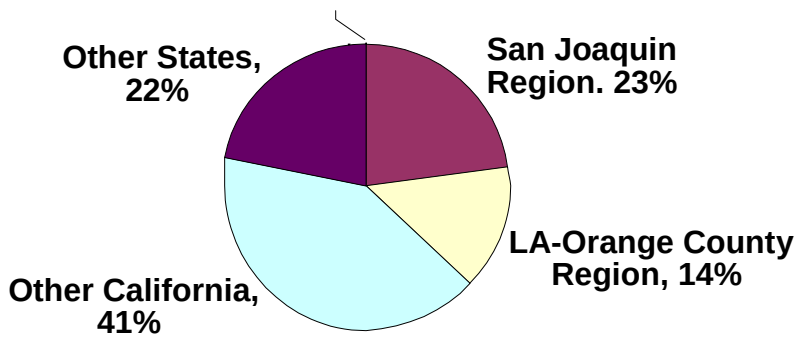
Inbound + Outbound + Internal



Inbound

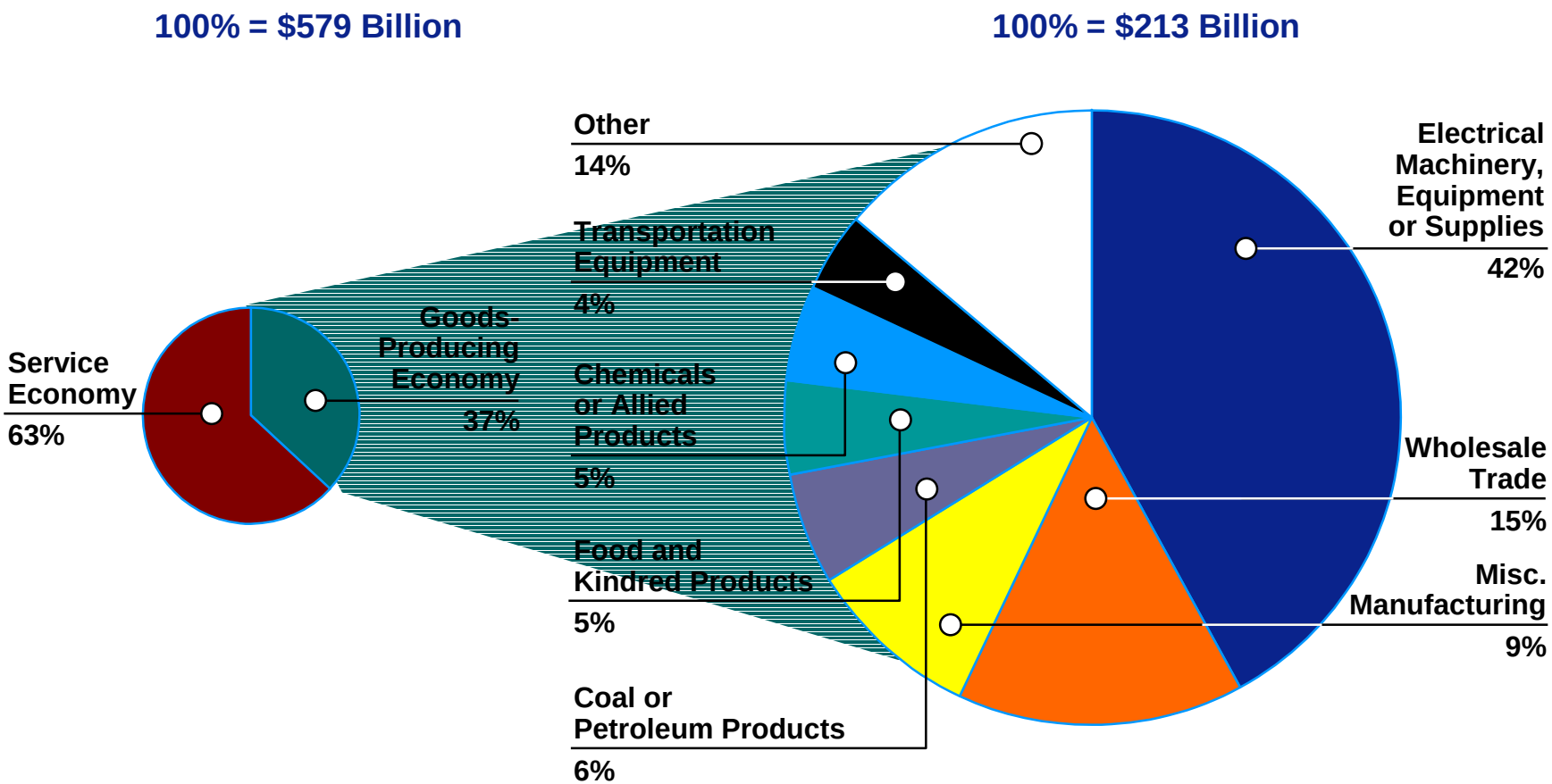


Outbound



Source: 1996 ITMS Data

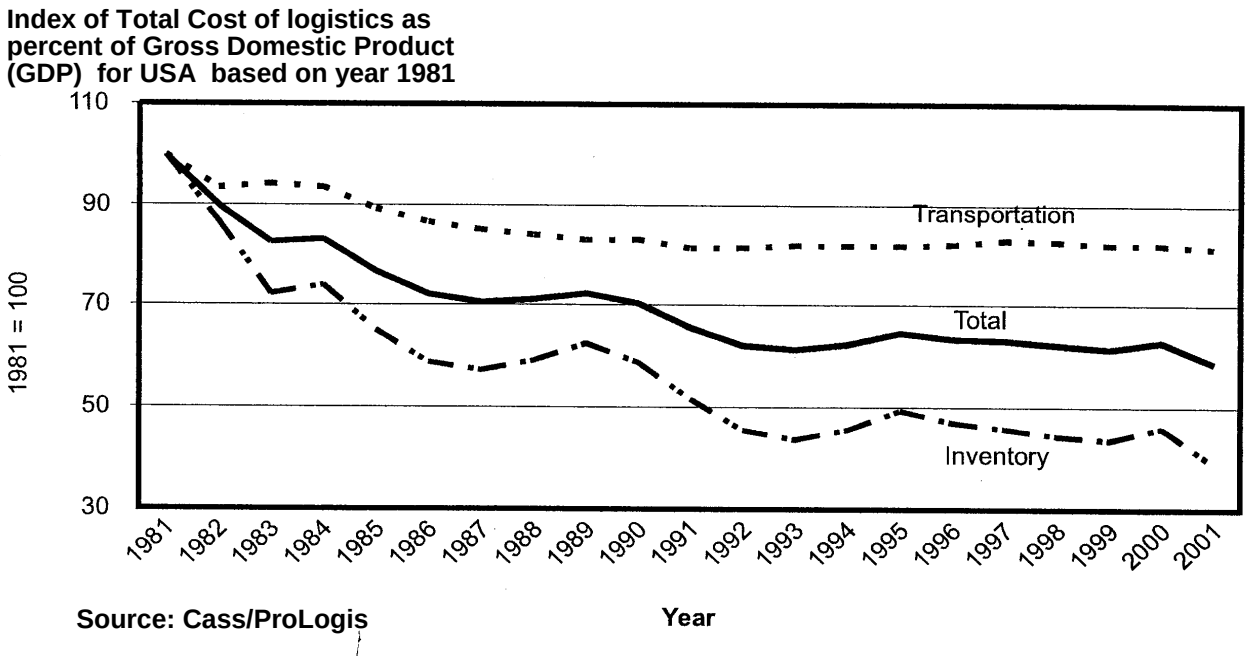
Shipping Industries Support 37 percent of the Bay Area's Economic Output



Source: Caltrans 2000 Impact Analysis for Planning (MPLAN) Data

CAMBRIDGE SYSTEMATICS INC

Manufacturing Businesses Are Trending Toward Smaller Inventories and Depending More on Transportation to Contend With Increased Demand for High-Value, Fast and Reliable Service



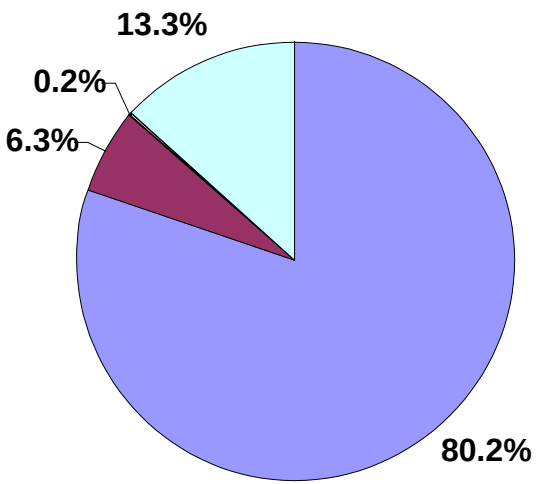
Source: Cass/ProLogis

- Trucks are becoming "rolling warehouses"
- "Better, faster, cheaper" is the mantra.
- Long-term trend shows total logistics costs have been reduced to 9.5 percent of U.S. GDP, as transportation costs have leveled off.

Trucking Carries the Largest Share (by both Tons and Value) of Bay Area Domestic Trade

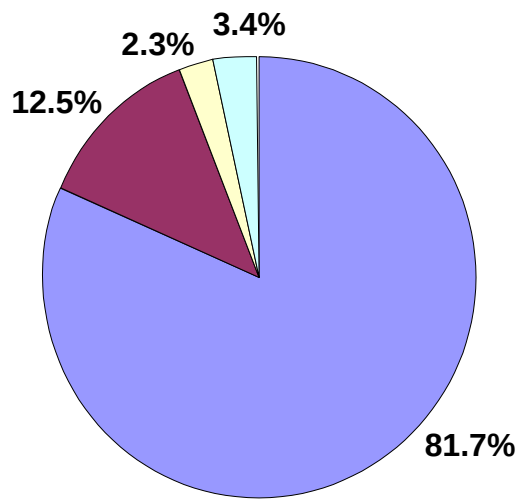
100% = 322 Million Tons

By Tons



100% = $408 Billion

By Value

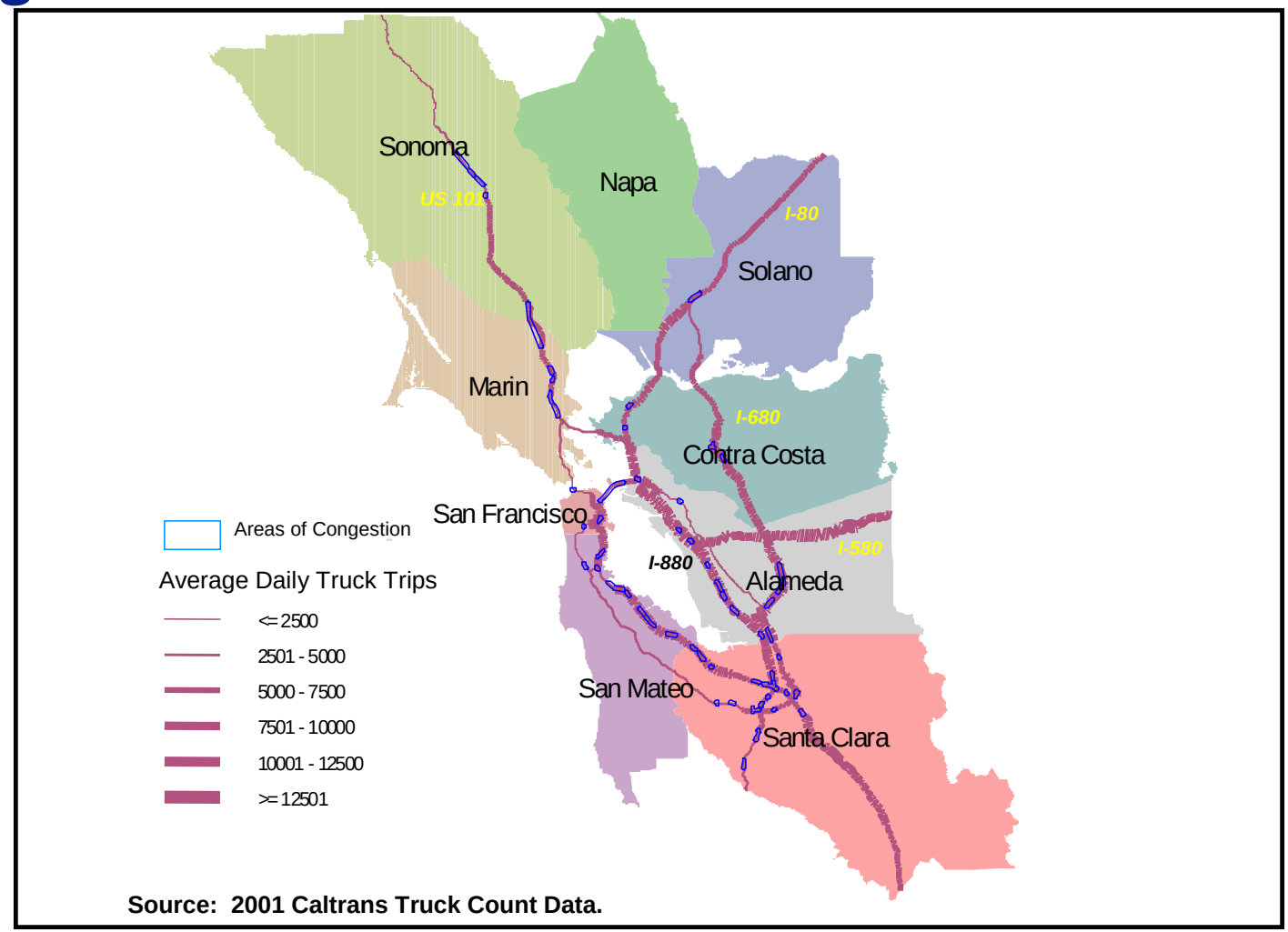


By Truck | By Rail | By Air | By Water

Source: 1996 ITMS Data

CAMBRIDGE SYSTEMATICS INC

Truck Traffic and Congestion – I-880/80/580/680 and U.S. 101 Have High Truck Volumes and Congestion



Source: 2001 Caltrans Truck Count Data.

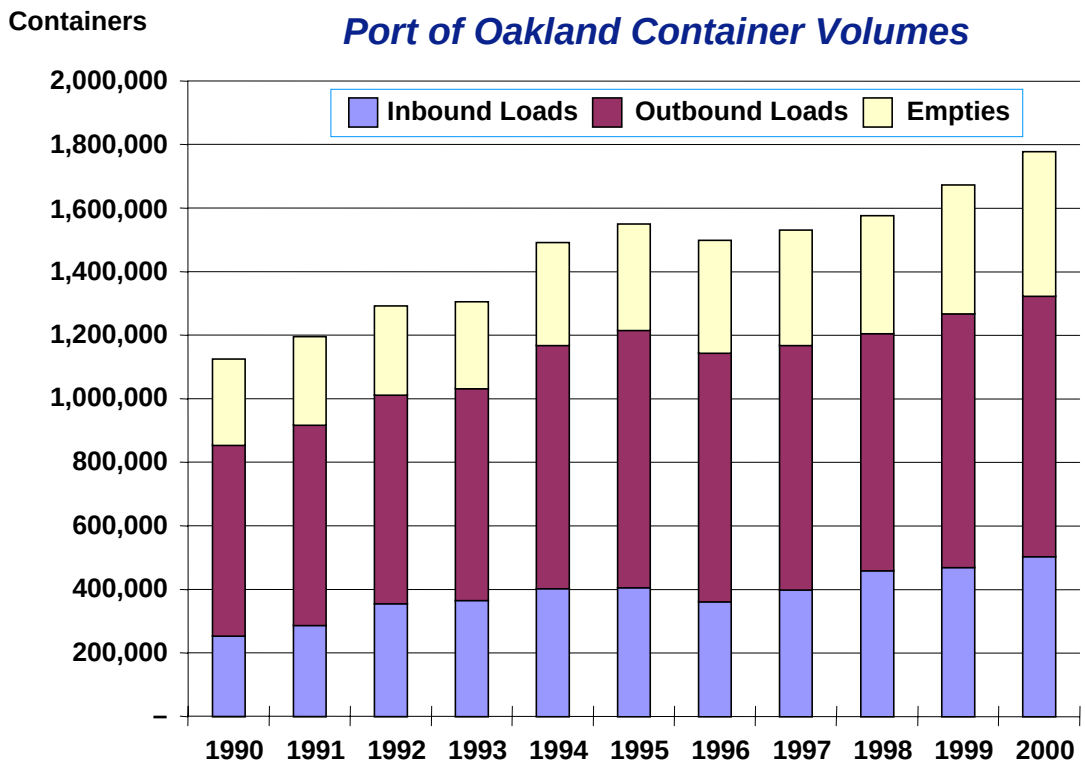
CAMBRIDGE SYSTEMATICS INC

Rail Intermodal Terminals in the Bay Area

*Oakland Intermodal Gateway.

Roadway Congestion Near the Port of Oakland and on the Freeway Access Network will be Critical to Being Able to Handle Projected Containerized Cargo Growth

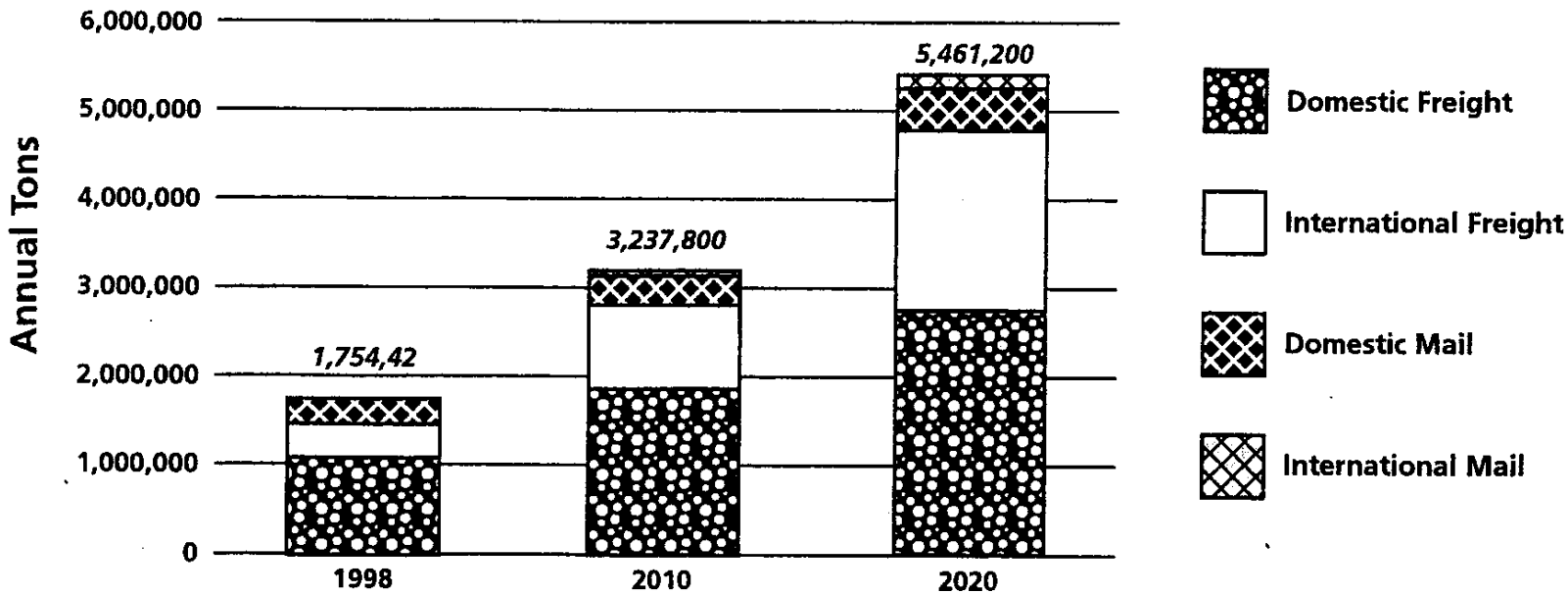
- **Oakland is an export port, unlike Long Beach and Los Angeles where exports are only about half of the import volume.**
- **Over the 10-year period shown, overall containerized cargo growth average 5% annually. Import loads grew fastest at 7%, while export loads grew at 3% and empties at 5%.**



CAMBRIDGE SYSTEMATICS INC

Bay Area Air Cargo Forecasts Growth by Segment

Total cargo tonnage will triple in the next 20-30 years to 5.5 tons annually



CAMBRIDGE SYSTEMATICS INC

Count of All-Cargo Flights Shows Greatest Growth at SFO, but OAK Has Higher Volume